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Applicant: Daisan Industrial Co., Ltd.
Title: MICROBICIDAL LUBRICANT

SPECIFICATION

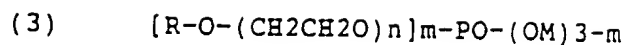
Title of the Invention:

MICROBICIDAL LUBRICANT

Claims:

1. A microbicidal lubricant comprising (A) one or more anionic surfactants selected from the group of the following general formulae (1), (2) and (3) and (B) a microbicidal quaternary ammonium type cationic surfactant:

- (1) $R-CO-NR'-(CH_2)_mCOOM$
- (2) $R-O-(CH_2CH_2O)_n(CH_2)_mCOOM$



where R represents a C8 to C20 alkyl group or alkenyl group;

R1 represents a C1 to C4 alkyl group;

n represents an integer of from 1 to 8;

m represents an integer of from 1 to 2; and

M represents a hydrogen, an alkali metal, an amine or an alkanolamine.

2. A microbicidal lubricant as claimed in claim 1, in which the weight ratio of (A) to (B) is from 5/95 to 80/20.

Detailed Explanation of the Invention:

Field of the Invention:

The present invention relates to a microbicidal lubricant which is used as a lubricant for a bottle conveyer for the step of bottling or canning milk, beer, sake, beverage and the like.

Prior Art:

In the step of bottling or canning milk, beer, sake, beverage and the like, a bottle conveyer is used for conveying bottles and cans. Since the bottle conveyer of the kind is continuously run by an automatic controlling system, only the bottle conveyer would be continuously run as it is even when the flow of bottles and cans is stopped. In the case, therefore, it is necessary that the

kinetic friction factor between the surface of the bottle conveyer and the bottles or cans thereon is lowered. In addition, in order that the bottles or cans as transferred from a washing machine are directly put on a bottle conveyer, the surface of the bottle conveyer is needed to have a suitable static friction factor.

As a lubricant which satisfies the necessities, one consisting essentially of a higher fatty acid soap has heretofore been known. For instance, there is a 1/100 to 1/200 lubricant solution consisting essentially of potassium palm acid soap, amine oleic acid soap or the like, and the solution is applied to the surface of a bottle conveyer.

Problems to be Solved by the Invention:

However, the above-mentioned known lubricant does not have a microbicidal capacity, though having a lubricative capacity of satisfying the above-mentioned requirements. Therefore, when it is applied to a bottle conveyer, it is inevitable that the surface of the conveyer is contaminated with microorganisms so that the bottles or cans on the conveyer are also contaminated with them.

Under the situation, the object of the present invention is to provide a microbicidal lubricant having a lubricative capacity of satisfying the above-mentioned

requirements and also having a microbicidal capacity, which lubricant is free from the above-mentioned drawbacks of the conventional lubricants to be provided by the prior art.

Means for Solving the Problems:

In order to attain the above-mentioned object, the present invention provides a microbicidal lubricant comprising (A) one or more anionic surfactants selected from the group of the following general formulae (1), (2) and (3) and (B) a microbicidal quaternary ammonium type cationic surfactant:

- (1) $R-CO-NR'-(CH_2)_mCOOM$
- (2) $R-O-(CH_2CH_2O)_n(CH_2)_mCOOM$
- (3) $[R-O-(CH_2CH_2O)_n]_m-PO-(OM)_3-m$

where R represents a C8 to C20 alkyl group or alkenyl group;

R1 represents a C1 to C4 alkyl group;

n represents an integer of from 1 to 8;

m represents an integer of from 1 to 2; and

M represents a hydrogen, an alkali metal, an amine or an alkanolamine.

Of the above-mentioned component (A), examples of the compound of formula (1) are oleoylsarcosine, capryloylsarcosine, N-oleoyl-N-butylglycine, oleoylalanine, linoylsarcosine and the like, as well as

their alkali metal salts, amine salts and alkanolamine salts; example of the compound of formula (2) are sodium oxyethylene-oleoylether-acetate, triethanolamine oxyethylene-caprylether-acetate, polyoxyethylene(n:4)-laurylether-acetic acid, sodium polyoxyethylene(n:2)-laurylether-acetate, potassium oxyethylene-laurylether-propionate, sodium oxyethylene-eicosylether-acetate and the like; and examples of the compound of formula (3) are triethylamine polyoxyethylene(n:2)-stearylether-phosphate, morpholine polyoxyethylene(n:2)-caprylether-phosphate, sodium polyoxyethylene(n:8)-laurylether-phosphate, amine di(oxyethylene laurylether)-phosphate and the like.

Specific examples of the microbicidal quaternary ammonium type cationic surfactant of the above-mentioned component (B) are alkyl dimethylbenzylammonium chlorides, alkyl trimethylammonium chlorides, alkyl pyridinium chlorides, dialkyl dimethylammonium chlorides and the like. The number of the carbon atoms of constituting the alkyl group in these compounds is not specifically defined. Especially preferred as the alkyl group is a long chain alkyl group having about 12 carbon atoms.

The ratio of (A) to (B) in the lubricant is not specifically defined. It may be from 5/95 to 80/20, preferably from 10/90 to 60/40, by weight as (A)/(B). If the lubricant contains only the component (A), it may have

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a lubricative capacity but has no microbicidal capacity. If it contains only the component (B), it may have a microbicidal capacity but its lubricative capacity is poor.

The microbicidal lubricant of the present invention may optionally contain a plasticizer, a defoaming agent and others. It may be diluted with water to suitable dilutions, which may be applied to the surface of a bottle conveyer.

Effect of the Invention:

The above-mentioned microbicidal lubricant of the present invention has a lubricative capacity derived from the component (A) and has a microbicidal capacity derived from the component (B). Therefore, it has both the lubricative capacity and the microbicidal capacity derived from them. In addition, by varying the ratio of (A) to (B) in the lubricant, the strength of the lubricative capacity and that of the microbicidal capacity may well be varied.

Examples:

Samples Nos. 1 to 37 each having the composition as indicated in Table 1 below were prepared in the form of aqueous 10 %, as their pure contents, solutions, and these samples were used as test samples. Samples Nos. 38 to 45 of the same table were used directly as test samples,

without being diluted. The test samples were subjected to a test for testing the microbicidal capacity and to a test for testing the lubricative capacity. The test results obtained are shown in Table 2 below. The tests of testing the microbicidal capacity and the lubricative capacity were carried out each in the manner mentioned below.

Test of Microbicidal Capacity:

In accordance with the test guidelines of the Food Sanitation Act, each of the test samples of Table 1 was diluted with a sterilized water to a determined dilution. Various test microorganisms were mixed with the dilutions for 2 minutes and 30 seconds at 25°C, and one platinum loop of each of the mixtures was inoculated in a liquid medium and incubated at 37°C for 48 hours whereupon the propagation, if any, of the microorganisms with each test sample was checked.

The test results are shown in Table 2, in which "+" indicates that the test microorganisms propagated and "-" indicates that they did not.

Test of Lubricative Capacity:

① Test Conveyer Condition:

Conveyer Speed: 60 to 150 cm/sec.

Test Bottles: two large-size beer bottles, each having a weight of 2490 g.

② Test Method:

Test bottles were put on a stainless steel conveyer plate, and a diluted solution (1/100 or 1/200) of the test sample was applied to the conveyer plate at a rate of 100 ml/min. After 10 minutes, the friction factor of the conveyer plate was measured.

Friction Factor (μ)

= [tensile resistance value (g) of spring balance]/[weight (g) of bottle filled with glass]

The evaluation of the lubricative capacity is as follows:

Evaluation	μ	
A	0.12 or less	Extremely lubricative.
B	up to 0.14	Lubricative with no problem.
C	up to 0.16	Somewhat insufficiently lubricative.
D	more than 0.16	Not lubricative.

Table 1 (parts by weight as pure contents)

Sample No.	1	2	3	4	5	6	7	8	9
Formula (1)		100	90	80	60	40	25	5	3
Triethanolamine oleoylsarcosine									
Sodium capryloylsarcosine									
Sodium N-oleoyl-N-butylglycine									
Sodium oleylalanine									
Sodium linoloylsarcosine									
Comparative Substance									
Potassium eicosanoylsarcosine									
Sodium caprylsarcosine									
Sodium N-oleoyl-N-pentylglycine									
Sodium N-oleoyl-N-methylaminobutyrate									
Formula (2)									
Sodium oxyethylene-oleylether-acetate									
Triethanolamine oxyethylene-caprylether-acetate									
Polyoxyethylene(n:4)-laurylether-acetic acid									
Sodium polyoxyethylene(n:2)-laurylether-acetate									
Potassium oxyethylene-laurylether-propionate									
Sodium oxyethylene-eicosylether-acetate									
Comparative Substance									
Sodium oxyethylene-docosylether-acetate									

Sample No.	1	2	3	4	5	6	7	8	9
Sodium polyoxyethylene(n:9)-laurylether-acetate									
Sodium oxyethylene-laurylether-butyrate									
Formula (3)									
Triethylamine polyoxyethylene(n:2)-stearylether-phosphate									
Morpholine polyoxyethylene(n:2)-caprylether-phosphate									
Sodium polyoxyethylene(n:8)-laurylether-phosphate									
Amine di(oxyethylene-laurylether)-phosphate									
Comparative Substance									
Sodium oxyethylene-hexylether-phosphate									
Polyoxyethylene(n:9)-butylether-phosphoric acid									
Tri(oxyethylene-butylether)-phosphoric acid									
Component (B)	100		10	20	40	60	75	95	97
Sanisol C (product of Kaoh Co.) (alkyldimethylbenzylammonium chloride)									
Arcard S-50 (product of Lion Aczo Co.) (alkyltrimethylammonium chloride)									
Cation DDC-50 (product of Sanyo Chemical Co.) (dialkyldimethylammonium chloride)									
Other Substance									
Anionic lubricant (Slider 905, product by Daisan Industrial Co.)									
10 % potassium palm acid soap									
20 % amine oleate soap									

Sample No.	1	2	3	4	5	6	7	8	9
10 % solid sodium soap									

Table 1 - continued

Sample No.	10	11	12	13	14	15	16	17	18
Formula (1)									
Triethanolamine oleoylsarcosine	50	30	60	15	30				
Sodium capryloylsarcosine									
Sodium N-oleoyl-N-butylglycine									
Sodium oleylalanine									
Sodium linoleoylsarcosine									
Comparative Substance									
Potassium eicosanoylsarcosine						20	50	50	40
Sodium caprylsarcosine									
Sodium N-oleoyl-N-pentylglycine									
Sodium N-oleoyl-N-methylaminobutyrate									
Formula (2)									
Sodium oxyethylene-oleylether-acetate									
Triethanolamine oxyethylene-caprylether-acetate									
Polyoxyethylene(n:4)-laurylether-acetic acid									
Sodium polyoxyethylene(n:2)-laurylether-acetate									
Potassium oxyethylene-laurylether-propionate									
Sodium oxyethylene-eicosylether-acetate									
Comparative Substance									
Sodium oxyethylene-docosylether-acetate									

Sample No.	10	11	12	13	14	15	16	17	18
Sodium polyoxyethylene(n:9)-laurylether-acetate									
Sodium oxyethylene-laurylether-butyrat									
Formula (3)									
Triethylamine polyoxyethylene(n:2)-stearylether-phosphate									
Morpholine polyoxyethylene(n:2)-caprylether-phosphate									
Sodium polyoxyethylene(n:8)-laurylether-phosphate									
Amine di(oxyethylene-laurylether)-phosphate									
Comparative Substance									
Sodium oxyethylene-hexylether-phosphate									
Polyoxyethylene(n:9)-butylether-phosphoric acid									
Tri(oxyethylene-butylether)-phosphoric acid									
Component (P)	50	70	40	85	70	80	50	50	60
Sanisol C (product of Kao Co.) (alkyldimethylbenzylammonium chloride)									
Arcard S-50 (product of Lion Azo Co.) (alkyltrimethylammonium chloride)									
Cation DDC-50 (product of Sanyo Chemical Co.) (dialkyldimethylammonium chloride)									
Other Substance									
Anionic lubricant (Slider 905, product by Daisan Industrial Co.)									
10 % potassium palm acid soap									
20 % amine oleate soap									

Sample No.	10	11	12	13	14	15	16	17	18
	10 % solid sodium soap								

Table 1 - continued

Formula (1)	Sample No.	19	20	21	22	23	24	25	26	27
Triethanolamine oleoylsarcosine										
Sodium caprylsarcosine										
Sodium N-oleoyl-N-butylglycine										
Sodium oleylalanine										
Sodium linoloylsarcosine										
Comparative Substance										
Potassium eicosanoylsarcosine										
Sodium caprylsarcosine										
Sodium N-oleoyl-N-pentylglycine										
Sodium N-oleoyl-N-methylaminobutyrate										
Formula (2)		20	80	30	40	60	50			
Sodium oxyethylene-oleylether-acetate										
Triethanolamine oxyethylene-caprylether-acetate										
Polyoxyethylene(n:4)-laurylether-acetic acid										
Sodium polyoxyethylene(n:2)-laurylether-acetate										
Potassium oxyethylene-laurylether-propionate										
Sodium oxyethylene-eicosylether-acetate										
Comparative Substance										
Sodium oxyethylene-docosylether-acetate								20		

Sample No.	19	20	21	22	23	24	25	26	27
Sodium polyoxyethylene(n:9)-laurylether-acetate								80	
Sodium oxyethylene-laurylether-butyrate									40
Formula (3)									
Triethylamine polyoxyethylene(n:2)-stearylether-phosphate									
Morpholine polyoxyethylene(n:2)-caprylether-phosphate									
Sodium polyoxyethylene(n:8)-laurylether-phosphate									
Amine di(oxyethylene-laurylether)-phosphate									
Comparative Substance									
Sodium oxyethylene-hexylether-phosphate									
Polyoxyethylene(n:9)-butylether-phosphoric acid									
Tri(oxyethylene-butyler)-phosphoric acid									
Component (B)	80	20	70	60	40	50	80	20	60
Sanisol C (product of Kaoh Co.) (alkyldimethylbenzylammonium chloride)									
Arcard S-50 (product of Lion Aczo Co.) (alkyltrimethylammonium chloride)									
Cation DDC-50 (product of Sanyo Chemical Co.) (dialkyldimethylammonium chloride)									
Other Substance									
Anionic lubricant (Slider 905, product by Daisan Industrial Co.)									
10 % potassium palm acid soap									
20 % amine oleate soap									

Sample No.	19	20	21	22	23	24	25	26	27
10 % solid sodium soap									

Table 1 - continued

Sample No.	28	29	30	31	32	33	34	35	36
Formula (1)									
Triethanolamine oleoylsarcosine								30	25
Sodium capryloylsarcosine									
Sodium N-oleoyl-N-butylglycine									
Sodium oleylalanine									
Sodium linoloylsarcosine									
Comparative Substance									
Potassium eicosanoylsarcosine									
Sodium caprylsarcosine									
Sodium N-oleoyl-N-pentylglycine									
Sodium N-oleoyl-N-methylaminobutyrate									
Formula (2)								20	
Sodium oxyethylene-oleylether-acetate									
Triethanolamine oxyethylene-caprylether-acetate									
Polyoxyethylene(n:4)-laurylether-acetic acid									
Sodium polyoxyethylene(n:2)-laurylether-acetate									
Potassium oxyethylene-laurylether-propionate									
Sodium oxyethylene-eicosylether-acetate									
Comparative Substance									
Sodium oxyethylene-docosylether-acetate									

Sample No.	28	29	30	31	32	33	34	35	36
Sodium polyoxyethylene(n:9)-laurylether-acetate									
Sodium oxyethylene-laurylether-butyrate									
Formula (3)									
Triethylamine polyoxyethylene(n:2)-stearylether-phosphate	60	50							
Morpholine polyoxyethylene(n:2)-caprylether-phosphate			50						
Sodium polyoxyethylene(n:8)-laurylether-phosphate				40					
Amine difoxyethylene-laurylether)-phosphate									
Comparative Substance									
Sodium oxyethylene-hexylether-phosphate					30				
Polyoxyethylene(n:9)-butylether-phosphoric acid						20	20		
Tri(oxyethylene-butylether)-phosphoric acid									
Component (B)									
Sanisol C (product of Kaoh Co.) (alkyldimethylbenzylammonium chloride)	40	50	50	60	70	80	80	50	
Arcard S-50 (product of Lion Aczo Co.) (alkyltrimethylammonium chloride)									50
Cation DDC-50 (product of Sanyo Chemical Co.) (dialkyldimethylammonium chloride)									
Other Substance									
Anionic lubricant (Slider 905, product by Daisan Industrial Co.)									
10 % potassium palm acid soap									
20 % amine oleate soap									

Sample No.	28	29	30	31	32	33	34	35	36
	10 % solid sodium soap								

Table 1 - continued

Sample No.	37	38	39	40	41	42	43	44	45
Formula (1)									
Triethanolamine oleoylsarcosine									
Sodium capryloylsarcosine									
Sodium N-oleoyl-N-butylglycine									
Sodium oleylalanine									
Sodium linoloylsarcosine									
Comparative Substance									
Potassium eicosanoylsarcosine									
Sodium caprylsarcosine									
Sodium N-oleoyl-N-pentylglycine									
Sodium N-oleoyl-N-methylaminobutyrate									
Formula (2)	20								
Sodium oxyethylene-oleylether-acetate									
Triethanolamine oxyethylene-caprylether-acetate									
Polyoxyethylene(n:4)-laurylether-acetic acid									
Sodium polyoxyethylene(n:2)-laurylether-acetate									
Potassium oxyethylene-laurylether-propionate									
Sodium oxyethylene-cicosylether-acetate									
Comparative Substance									
Sodium oxyethylene-docosylether-acetate									

Sample No.	37	38	39	40	41	42	43	44	45
Sodium polyoxyethylene(n:9)-laurylether-acetate									
Sodium oxyethylene-laurylether-butyrate									
Formula (3)									
Triethylamine polyoxyethylene(n:2)-stearylether-phosphate									
Morpholine polyoxyethylene(n:2)-caprylether-phosphate									
Sodium polyoxyethylene(n:8)-laurylether-phosphate									
Amine di(oxyethylene-laurylether)-phosphate									
Comparative Substance									
Sodium oxyethylene-hexylether-phosphate									
Polyoxyethylene(n:9)-butylether-phosphoric acid									
Tri(oxyethylene-butylether)-phosphoric acid									
Component (B)	50					10	10	10	10
Sanisol C (product of Kaoh Co.) (alkyldimethylbenzylammonium chloride)									
Arcard S-50 (product of Lion Aczo Co.) (alkyltrimethylammonium chloride)									
Cation DDC-50 (product of Sanyo Chemical Co.) (dialkyldimethylammonium chloride)									
Other Substance		100	100	100		90	90	90	
Anionic lubricant (Slider 905, product by Daisan Industrial Co.)									
10 % potassium palm acid soap									
20 % amine oleate soap									

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Sample No.	37	38	39	40	41	42	43	44	45
	10 % solid sodium soap				100				90

Table 2

	Dilution with Water	Sample No.														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Escherichia coli	1/500	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
Staphylococcus aureus	1/1000	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
Pseudomonas aeruginosa	1/500	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-
Lubricative Capacity	1/100	D	A	A	A	A	A	A	B	C	A	B	B	A	A	D
Lubricative Capacity	1/200	D	A	A	A	A	A	A	B	C	A	B	B	A	A	D

Table 2 - continued

	Dilution with Water	Sample No.														
		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Escherichia coli	1/500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Staphylococcus aureus	1/1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pseudomonas aeruginosa	1/500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lubricative Capacity	1/100	C	D	D	A	B	A	A	A	C	D	C	A	A	A	A
Lubricative Capacity	1/200	D	D	D	B	B	A	A	A	D	D	D	B	B	B	A